UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,533	06/23/2003	Tomochika Murakami	00862.023103.	5793

5514 7590 03/20/2007		EXAMINER
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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *5-10,13 and 14* is/are allowed.

6)☒ Claim(s) *1-4,11,12,15-19 and 21* is/are rejected.

7)☒ Claim(s) *20 and 22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *6/23/03,9/3/03,10/24/06,3/7/07.*

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Specification

1.   The title of the invention is not descriptive. A new title is required that is clearly

indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 101

2.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or
> any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and
> requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject
Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as
follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive
> material." In this context, "functional descriptive material" consists of data structures and computer programs
> which impart functionality when employed as a computer component. (The definition of "data structure" is "a
> physical or logical relationship among data elements, designed to support specific data manipulation functions."
> The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional
> descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement
> of data.
>
> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and
> functionally interrelated to the medium and will be statutory in most cases since use of technology permits the
> function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d
> 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases
> computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to
> computer having a specific data structure stored in memory held statutory product-by-process claim) with
> Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).
>
> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element
> which defines structural and functional interrelationships between the computer program and the rest of the
> computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32
> F.3d at 1583-84, 32 USPQ2d at 1035.

3.   Claims 15, 17, 19, and 21 are rejected under 35 U.S.C. 101 because the claimed invention

is directed to non-statutory subject matter as follows. Claims 15, 17, 19, and 21 each define a

"computer program" embodying functional descriptive material. However, the claims do not

define a computer-readable medium or memory and are thus non-statutory for that reason (i.e.,

"When functional descriptive material is recorded on some computer-readable medium it

becomes structurally and functionally interrelated to the medium and will be statutory in most

cases since use of technology permits the function of the descriptive material to be realized" –

Guidelines Annex IV). That is, the scope of the presently claimed "computer programs" can

range from paper on which the program is written, to a program simply contemplated and

memorized by a person. The examiner suggests amending the claims to embody the program on

"computer-readable medium" or equivalent in order to make the claims statutory. Any

amendment to the claim should be commensurate with its corresponding disclosure.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on
> sale in this country, more than one year prior to the date of application for patent in the United States.

5.   Claims 11 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by "High

Capacity Image Steganographic Model" by Lee et al. ("Lee").

Regarding claim 11, Lee discloses an image processing method of multiplexing noise on

multilevel image data to embed visible additional information (i.e. watermarks such as images,

text, etc. which represent visible "input messages" are embedded—see § 2, p. 289) with a noise-

multiplexed distribution, comprising:

an input step of inputting, as the additional information, information representing whether or not to multiplex noise for each pixel (§ 3, p. 292: a random number in the range [0,1] is generated for each pixel and compared to a user-specified threshold—the result of the comparison is used ("inputted") in order to determine whether to embed a watermark ("additional information") into a pixel of interest);

a determination step of determining on the basis of the additional information whether a pixel of interest in the multilevel image data is located at a position where noise is to be multiplexed (§ 3, p. 292: the inputted comparison result is used to determine whether a pixel of interest is at a location where a watermark will be embedded—if the result indicates that the random number was smaller than the threshold then the watermark will be embedded into the pixel; otherwise it will not be embedded);

a specifying step of, when the pixel of interest is determined in the determination step to be located at the position where noise is to be multiplexed, specifying a second bit region where noise is to be multiplexed, on the basis of a state of a first bit region in a bit configuration which constitutes the pixel of interest (§ 2.1.1, p. 291: when a pixel is to be embedded with watermark information based on the determination in § 3, the "bit region" (second bit region) where the watermark is to be embedded in the pixel of interest is specified as the capacity $K(x,y)$ of the pixel—the capacity denotes the number of least significant bits that can be subjected to watermark insertion and is based, *inter alia*, on an upper bound for embedding capacity at the pixel of interest, $U(x,y)$—as shown in the first column on p. 291, the value of $U(x,y)$ is based on whether the value of the pixel of interest $f(x,y)$ is less than the threshold t=191; with Lee's pixels represented as gray-level values in 8 bits, the comparison of $f(x,y)$ to the threshold t requires

determining whether the most significant bit of $f(x,y)$ is "1"—if the MSB of $f(x,y)$ is "0", then the

value of $f(x,y)$ is less than 128—on the other hand, if the MSB of $f(x,y)$ is "1", then the second

MSB can be checked—if the 2nd MSB is "1", then the value of $f(x,y)$ is at least 192 and therefore

greater than the threshold—otherwise, if the 2nd MSB is "0", then every other bit in $f(x,y)$ must

be "1" for the pixel to have a value of 191; that is, binary 10111111 = 191;

in sum, the "bit region" (second bit region) where the watermark is to be embedded in the

pixel of interest is specified as the capacity $K(x,y)$ and is based at least on the value of the MSB

of the pixel of interest, or "first bit region"); and

a change step of reversibly changing bit information for the bit region of the pixel of

interest specified in the specifying step (§ 2.1.2, p. 291: a minimum-error method is used to

reversibly change bits within a bit region of least significant bits for a pixel of interest according

to the calculated capacity of the pixel).

Regarding claim 12, Lee discloses an image processing method of removing visible

additional information (i.e. watermarks such as images, text, etc. which represent visible "input

messages" are embedded and extracted—see § 2, p. 289) from multilevel image data in which

noise is reversibly embedded to multiplex the visible additional information, comprising:

an input step of inputting, as the additional information, information representing whether

or not to multiplex noise for each pixel; a determination step of determining on the basis of the

additional information whether a pixel of interest in the multilevel image data is located at a

position where noise is multiplexed (see figure 2, p. 289; § 3, p. 292; § 5, p. 294: the stego-key is

provided to the receiver of the watermarked image so that the locations of pixels with embedded

bits can be identified in the same manner as described in § 3, p. 292);

a specifying step of, when the pixel of interest is determined in the determination step to

be located at the position where noise is multiplexed, specifying a second bit region where noise

is multiplexed on the basis of a state of a first bit region in a bit configuration which constitutes

the pixel of interest; and a reconstruction step of performing conversion inverse to noise

multiplexing to reconstruct a state of the bit region of the pixel of interest specified in the

specifying step into a state before multiplexing (see figure 3: for the extracting module, Lee

performs the same capacity evaluation routine executed for the embedding process in order to

extract the embedded bits and reconstruct the watermarked image).

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

7.   Claims 1-4, and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over

"High Capacity Image Steganographic Model" by Lee et al. ("Lee").

Regarding claims 1, 4, and 15-18, since Lee's disclosure is written in terms of a

computer-implemented method, it does not expressly disclose the apparatus comprising means or

computer program for performing the claimed steps corresponding to claims 11 and 12, *per se*.

However, at the time the invention was made, those skilled in the art would have readily

understood that Huang's method was intended to be performed via a computer, thereby

necessitating the employment of physical components to perform the method, e.g. processors or

the like performing programmed methods. That is to say that the claimed apparatus and

computer program for embedding and removing bits are rendered obvious in view of Lee's

corresponding method for the same—*Official Notice taken.*

Regarding claim 2, Lee discloses using a luminance value as a reference (i.e. Lee's image

data is in terms of brightness values), the first bit region includes a predetermined number of

upper bits including a most significant bit, and the second bit region includes lower m bits which

include a least significant bit and change in accordance with a value of the second bit region (see

explanation for claim 11 above).

Regarding claim 3, Lee discloses setting information on an intensity for multiplexing

noise (figure 2: a watermark or "message" is specified in terms of intensity values to be changed

in a "cover medium"—see also "bitstream" in figure 3), and specifying the bit region where noise

is to be multiplexed on the basis of the set information on the intensity and data of the first bit

region (i.e. the "message" is embedded based on the bit values in the message and the calculated

capacity, which is based on the data of the first bit region as explained above).

Allowable Subject Matter

8.   Claims 5-10, 13, and 14 are allowed. Claims 19 and 21 would be allowable if amended to

overcome the above requirement under 35 USC § 101. Claims 20 and 22 are objected to as being

dependent upon a rejected base claim, but would be allowable if rewritten in independent form

including all of the limitations of the base claim and any intervening claims.

Regarding claim 5, Lee does not disclose or suggest converting the image data into frequency components and then "specifying a second bit region where noise is to be multiplexed, on the basis of a state of a first bit region in data which constitutes a low frequency component ... and reversibly changing bit information for the second bit region in the data of the low frequency component," as claimed. Rather, Lee embeds bit information (i.e. watermarks) in the image domain and does not suggest performing an analogous procedure in the frequency domain on low frequency data. In other words, Lee does not generate a low frequency component and then multiplex noise into a second bit region of the low frequency component based on the value(s) of bit(s) contained in a first bit region of the low frequency component, as claimed. For this reason, claim 5 is allowable. Claims 13 and 19 are method and computer program claims that directly correspond to claim 5 and would be allowable for the same reason. Claims 10, 14, and 21 constitute the apparatus, method, and computer program for removing embedded information; they represent the substantial inverses of claims 5, 13, and 19 and would be allowable for the same reasons.

Related Prior Art

9.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

U.S. Patent 5,530,759 by Braudaway et al.;

U.S. Patent 6,137,892 by Powell et al.;

U.S. Patent Application Publication 2006/0115112 by Yeung et al.;

U.S. Patent 7,174,030 by Sugahara et al.;

U.S. Patent Application Publication 2003/0099373 by Joo et al.;

"Embedding Image Watermarks in DC Components" by Huang et al.;

"A Robust DCT-Based Watermarking for Copyright Protection" by Lin et al.;

"A DWT-Based Image Watermarking Algorithm" by Daren et al.;

"A DCT Domain Visible Watermarking Technique for Images" by Mohanty et al.; and

"Wavelet Domain Adaptive Visible Watermarking" by Hu et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Colin M. LaRose whose telephone number is (571) 272-7423. If

attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor,

Bhavesh Mehta, can be reached on (571) 272-7453. The fax phone number for the organization

where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000. Any inquiry

of a general nature or relating to the status of this application or proceeding can also be directed

to the TC 2600 Customer Service Office whose telephone number is (571) 272-2600.

Colin M. LaRose
Group Art Unit 2624
14 March 2007